of the deified chief of that name, a renowned fighter who lived in the reign of Nakibinge, the eleventh king of the Baganda.

Objects such as these are not readily to be obtained; indeed, it required years of careful investigation and all the knowledge and experience gained in the field by this veteran missionary to negotiate their safe removal from the ancient shrines of Uganda to the show-cases of the University museum.

MANCHESTER.—Daily observations at the meteorological Observatory of the University at Glossop Moor are now being taken with kites or captive balloons, and preliminary records of the results are being published every day in the *Daily Telegraph* and other papers. The work, which has been instituted by Prof. A. Schuster, F.R.S., is under the immediate direction of Mr. J. E. Petavel, F.R.S., assisted by the following staff:—Mr. Travis Rimmer, resident observer at Glossop Moor; Messrs. T. V. Pring and W. A. Harwood, and Miss Margaret White, voluntary assistants. The generous cooperation of the meteorological observatories at Buxton, Huddersfield, Stonyhurst, Sheffield, and Manchester will facilitate the working out of comparative results, in the subsequent utilisation of the observations, and should add greatly to the value of this investigation of the meteorology of the upper atmosphere.

AT a dinner of the Bristol University College Colston Society on Tuesday, the president, Mr. G. A. Wills, stated that contributions towards a university for Bristol have in the past two years amounted to 40,000*l*. He also announced that his father, Mr. H. O. Wills, has promised 100,000*l*. towards the endowment of the university for Bristol and the west of England provided a charter be granted within two years.

THE national importance of brain-power produced by universities, as well as sea-power obtained by a strong navy, was insisted upon by Sir Norman Lockyer in his presidential address to the British Association in 1903; and a comparison was made of the expenditure on higher education with that on battleships. Prof. Turner, of the University of Birmingham, speaking at Stourbridge on January 6 in connection with the Stourbridge and District Higher Education Committee, used similar illustrations in referring to the cost of technical education. He pointed out that the Birmingham University and other local colleges and universities obtain a total grant per annum of about 100,000*l*. Let this be compared with our naval expenditure, and it is found that to build one battleship of the *Dreadnought* type absorbs the whole of the funds allocated to the local universities for seventeen years. Battleships are a necessity, but the Army and Navy cannot exist apart from the nation's third line of defence—its internal manufactures—and these depend largely upon the rearing of an educated and skilled people.

THE annual meeting of the Geographical Association was held on January 8. Mr. Douglas Freshfield, who presided, said that last year he had found it necessary to comment on the extraordinary decision of the Civil Service Commissioners to exclude geography from the examinations for the higher branches of the Civil Service, including the Foreign Office, but now he was able to congratulate the association upon a reversal of that decision. The report read supplied evidence that the association continues energetically its work of improving geographical instruction. Major Close delivered a lecture on map projection. It may be noticed that various lectures on the teaching of geography have been arranged by the association. The first will be delivered by Mr. G. G. Chisholm on January 24, at 8 p.m., at University College, and the second, on scientific method in the teaching of geography, by Prof. R. A. Gregory, on February 14 at the same place and time. The remaining lectures will be delivered on alternate Fridays upon the following subjects:—Physical geography as an essential part of school geography, Mr. T. Alford Smith; how to teach the geography of a country, Prof. L. W. Lyde; orographical maps as the basis of the geography lesson, Dr. A. J. Herbertson; and geographical laboratories, Mr. A. T. Simmons. Particulars may be obtained from Mr. J. F. Unstead, 5 Wiverton Road, Sydenham.

THE issue of *Science* for December 20, 1907, contains the annual opening address delivered last October by Prof. F. F. Wesbrook, of the University of Minnesota, before the faculty of science of the University of Manitoba at Winnipeg. Discussing the needs of the Canadian university, Prof. Wesbrook instituted an interesting comparison between what is required in the direction of higher education in Manitoba and the similar needs of the University of Minnesota, which was founded nine years earlier than the Canadian institution. Although Manitoba has had a university since 1877, it cannot be said as yet to have made provision for it which is at all adequate. Manitoba has now a population of about 380,000, and with all the demand on her for increased university facilities has only been able to expend approximately 16,000*l*. for building and permanent improvement, and for maintenance 3000*l*. per annum (which until last year was only 1200*l*.), with an addition of 5000*l*. from land grant and other sources, making a total current expenditure of 8000*l*. per annum. In the case of Minnesota University, there were in 1887 only 412 students registered out of a State population of 1,180,000, and there was available 7000*l*. from State funds and a total of practically 14,000*l*. from all sources, with a total student attendance per ten thousand population of 3·49. In 1906 the population of the State had nearly doubled, the University attendance had increased to 3956, the total funds derived from the State to 50,300*l*. per annum, the total annual current expense of the University, exclusive of buildings and permanent improvements, was 108,400*l*. per annum, and the attendance at the University for each ten thousand of State population was twenty students. The total expenditure for maintenance, exclusive of State grants for hospital maintenance, special investigations, library expenses, repairs, and so on, will this year be above 132,600*l*. Well may Prof. Wesbrook urge the people of Manitoba to emulate the American example he cites. It is to be hoped that the approaching visit of the British Association to Winnipeg will assist the Canadian authorities in developing the University.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 14, 1007.—"On the Cranial and Facial Characters of the Neandertal Race." By Prof. W. J. **Sollas.**

As a result of a comparison of the calvarium of the Neandertal race with that of the aborigines of South Australia, it is shown that a much closer resemblance exists than some authorities have supposed, especially as regards the calottal height, Schwalbe's ("bregma") angle, and the bregma index. The chief differences are to be found in the cephalic index, the continuity of the frontal torus, and the deeply impressed character of the frontal fossa.

Comparisons based on the glabella-inion line are misleading, owing to the inconstancy in position of the inion.

The exterior foramino-basal angle owes its perplexing anomalies to the fact that its magnitude is determined by five variables, one of which is connected with the cranial height, so that in depressed forms of skull it acquires a higher value than might otherwise be expected.

The Gibraltar skull is the only example of the Neandertal race which presents the bones of the face and the basi-cranial axis in undisturbed connection with the calvarium. Its characters, apart from the cranial vault, are unique; no other known skull possesses so long a face or such a large and broad nasal aperture. In profile, the nasal curve flows into that of the glabella, without any sudden change of flexure, that is, there is no nasal notch, such as occurs in the Australians.

The orbit, as in all skulls of the Neandertal race, is distinguished by its excessive height above a line drawn from the nasion to the middle of the fronto-zygomatic suture.

The sphenethmoidal angle has been measured from the limbus sphenoidalis by a line drawn to the crista galli on the one hand and the basion on the other; it exceeds the corresponding angle of the lowest known South Australian skull, similarly measured, by 16° 30′.

The palate is very dolicho-uranic. The thickness of the frontal bone, measured on one side of the crista galli, is 24 mm. The prognathism of the upper jaw, in whatever way measured, is extremely small, so that the skull must be classed as orthognathous.

The cranial capacity is estimated at 1250 c.c., a close approach to that of the Neandertal calotte. The average capacity of South Australian skulls is very similar, but ranges from 1460 c.c. to 1100 c.c. If the calotte of Pithecanthropus represents the mean of a similarly variable race, then the extreme forms of such a race would almost completely bridge over the hiatus between man and the higher apes.

Society of Chemical Industry, January 6.—Dr. J. Lewkowitsch in the chair.—Some observations on the keeping power of Fehling's solution, together with notes on the volumetric process of determining reducing sugars with it: Dr. Francis **Watts** and H. A. **Tempany.** The authors point out that, contrary to the commonly expressed idea, Fehling's solution, or at least Violette's modification of it, is not liable to deteriorate rapidly if kept in the dark, and if access of air is prevented. The solution can thus be kept mixed ready for use for many months, and it is not necessary to keep the stock in the form of two solutions to be mixed as required.—The determinations of small quantities of bismuth: H. W. **Rowell.** Methods of separation suitable for ores, copper, and base bullion are given which eventually precipitate the bismuth, together with various impurities which do not affect the subsequent colorimetric estimation, but aid in the collection of the bismuth. The colour test depends upon the solubility of bismuth iodide in excess of potassium iodide producing a yellow colour. The test is very delicate, and the amount of bismuth in copper or base bullion may be determined within five hours.

Mathematical Society, January 9.—Prof. W. Burnside, president, in the chair.—The distinctive character of Lord Kelvin's mathematical investigations: Prof. A. E. H. **Love.**—A formula of interpolation: C. S. **Jackson.**—Hilbert's invariant integral in the calculus of variations: T. J. I'A. **Bromwich.**—An operator related to q-series: Rev. F. H. **Jackson.**

PARIS.

Academy of Sciences. January 6.—M. Henri Becquerel in the chair.—Report presented in the name of the section of geography and navigation concerning a subject put forward by the Geographical Society of Paris relating to meteorological telegrams from Iceland: Bouquet **de la Grye.**—The transformations of the comet 1907*d*: Ernest **Esclangon.** The variations in the form of the comet on approaching perihelion were studied under very favourable conditions of weather and atmosphere, and are illustrated by six diagrams.—The use of flames as valves for alternating high-tension currents: André **Cathiard.** When two electrodes, one of which has a very small section compared to the other, are placed in a flame and in a high-tension (2000 volts to 10,000 volts) circuit, a small continuous current passes, a sort of faintly luminous arc being produced in the flame. In the experiments described, the frequency was forty per second, and a current was obtained, not exceeding 0·03 ampere, capable of producing galvanic deposits. The nature of the current has not yet been studied with the oscillograph.—Contribution to the study of the formation of certain precious stones of crystallised alumina: F. **Bordas.** Exposure to a temperature of 300° C. for a long time causes the yellow colour of both natural (Oriental topaz) and artificial yellow corundums to disappear. The Oriental emerald, a very rare stone, can be produced by starting with a sapphire-blue stone and subjecting it to the above temperature for a certain time. Further experiments with the kathode rays, analogous to the β-radium rays, do not cause colourless corundums to pass to yellow, and the yellow stones are not affected.—The harmonics of a vibrating body: G. **Sizes** and G. **Massol.**—Some new homologues of diglycollic acid: E. **Jungfleisch** and M. **Godchot.**—The mechanism of the transpositions of the phenyl group in the iodohydrins and aromatic glycols: Marc **Tiffeneau.** Although the mechanism of the transpositions of iodohydrins of the type Ar(R)C(OH).CHI.R is definitely established, the interpretation of the mechanism of the transpositions of the aromatic glycols by the formation of diethylene oxides can only be considered as provisional.—The structure of the fundamental substance of hyaline cartilage: Ed. **Retterer.** From the morphological and structural point of view, the fundamental substance of hyaline cartilage is identical with bone substance. It represents, in fact, only the second stage of evolution of the cytoplasma of the cartilaginous cell.—The development and structure of the spores of *Thelohania Giardi*: L. **Mercier.**—The existence of six branchial arches and six aortic arches in the embryo of the mole: A. **Soulié** and C. **Bonne.**—The fertilisation and development of the eggs in *Rhopalura ophiocomae*: Maurice **Caullery** and Alphonse **Lavallée.** The egg evolves into an embryo with perfectly individualised cells, and having none of the plasmodial structure of the ulterior parasitic stages. Ten figures of the egg in different stages of development accompany the paper.—Prolonged anæsthesia by mixtures of oxygen and ethyl chloride: Pierre **Rosenthal** and Albert **Berthelot.** The authors have been able to prolong the anæthesia due to ethyl chloride by administering it mixed with oxygen. In experiments with animals, a true anæsthesia lasting an hour was obtained, the subject going under very rapidly, the narcosis quiet, and recovery prompt. They hope to be able to apply the method to human subjects, more especially as this anæsthetic has the great advantage of not causing the after effects of ether and chloroform.—The slow action of chlorinated products derived from bacilli: MM. **Moussu** and **Goupil.**—The value of the magnetic elements at the Observatory of Val-Joyeux on January 1, 1908: Th. **Moureaux.**—The study of a series of specimens of sea-water collected in the English Channel: A. **Chevallier.** Determinations were made of the density, temperature at the time of collection, chlorine, and sulphuric acid. A curve is given showing the difference of density as ordinates, and the distance from Dieppe as abscissæ.

NEW SOUTH WALES.

Royal Society, October 2, 1907.—Mr. H. Deane, president, in the chair.—Law of meteorological phenomena: A. G. **Williams.**—A simple form of Sprengel vacuum pump: Prof. J. A. **Pollock.** A modified short-fall Sprengel vacuum pump of moderate dimensions is described, in which the raising of the mercury, necessary for continuous working, is effected by evaporating the mercury at a lower and condensing it at a higher level.—Note on the internal structure of some gold crystals: Prof. A. **Liversidge.** The author exhibited sections of isolated crystals and groups of gold crystals, mainly octahedra and rhombic dodecahedra, and photographs of the same before and after cutting. The simple faces on polishing and etching showed that the internal structure did not correspond with the external; *e.g.* in one case the rhombic planes of an externally simple dodecahedron were found to be made up of two triangular faces; on these triangles there were also faces of smaller crystals. Some showed a still more complex structure.

November 6, 1907.—Mr. H. A. Lenehan, vice-president, in the chair.—Notes on the Arranda tribe: R. H. **Mathews.**—A short, accurate method for the estimation of iron, alumina, and phosphoric acid when occurring together: Dr. T. **Cooksey.** When iron, alumina, and phosphoric acid occur together the iron is estimated by a volumetric process (as, for instance, by means of potassic iodide and thiosulphate of soda); the phosphates of the two metals are weighed, and the phosphoric acid in filtrate estimated, as previously described. These data are sufficient for the determination of all three quantities. The method is short and very accurate.—Note on the formation of formaldehyde in solutions of cane sugar, and its bearing on Hehner's test for formaldehyde in saccharine mixtures: A. A. **Ramsay.** The author directs attention to the production of formaldehyde when cane sugar and water are heated at a temperature below that at which caramelisation might take place. This fact explains how a reaction for formaldehyde by the Hehner test (which is one generally used, and particularly delicate) may be obtained from manufactured products

such as jams, sweetened condensed milk, or saccharine liquids, &c., and to which the manufacturer has added no formaldehyde, by the usual analytical operations of distilling a slightly acidified aqueous solution of the substance and testing the distillate, since the act of distilling a saccharine liquid results in the formation of formaldehyde.

Linnean Society, November 27, 1907.—Mr. J. H. Maiden, vice-president, in the chair.—The geology of the Nandewar Mountains, New South Wales: H. I. **Jensen.** The physiography and geology of the Nandewars offer points of similarity to those of the Warrumbungle Mountains. For example, the Nandewars present the features of arid erosion, and the level country to the west of them forms an arid-erosion peneplain. In late Palæozoic times the present line of trachyte necks was practically a shore-line, with land to the west and sea to the east. By the end of the permo-Carboniferous period, the sea had given place to a fresh-water lake. In Triassic and Cretaceous times sedimentation took place west of this line, and erosion east of it. During late Mesozoic times the area of the Nandewar Mountains was reduced to a peneplain; basic laccolites were injected, and basic lavas flowed over parts. During early Tertiary times much faulting took place. Lavas escaped from the main fissure and from numerous cross-fractures. Tuffs, ashes, and breccias were ejected, and alkaline lavas solidified in their vents. Gradually more basic types of lava were emitted. In one respect the Nandewar Mountains differ from the Warrumbungles in that, in the Nandewars, sill-structure is represented on a grand scale.

DIARY OF SOCIETIES.

THURSDAY, JANUARY 16.

ROYAL SOCIETY, at 4.30.—Alternate Current Measurement: Dr. W. E. Sumpner.—Prominence and Coronal Structure: Dr. W. J. S. Lockyer.—The Conversion of Diamond into Coke in High Vacuum by Kathode Rays: Hon. C. A. Parsons, C.B., F.R.S., and A. A. Campbell Swinton. On the Perception of the Direction of Sound: Prof. C. S. Myers and Prof. H. A. Wilson, F.R.S.—Preliminary Note on Certain Phenomena of the Electric Discharge through Rarefied Nitrogen: Dr. G. J. Burch, F.R.S., J. E. Marsh, F.R.S., and R. de J. F. Struthers.

ROYAL INSTITUTION, at 3.—The Building of Britain: Prof. W. W. Watts, F.R.S.

INSTITUTION OF MINING AND METALLURGY, at 8.—The Vaal River Diamond Diggings: M. Park.—The Eruptive Diamond-bearing Breccias of the Boshof District, South Africa: J. P. Johnson.—The Auriferous Banded Ironstones and Associated Schists of South Africa: O. Letcher.

SOCIETY OF ARTS, at 4.30.—Indian Agriculture: Henry S. Lawrence.

LINNEAN SOCIETY, at 8.—(1) Brassica Crosses, illustrated by lantern slides: (2) Notes on Wild Types of Tuber-bearing Solanums, illustrated by lantern slides: A. W. Sutton.—Revision of the genus Illigera, Blume: S. T. Dunn.—New Coniferæ of Formosa: Bunzō Hayata.

CHEMICAL SOCIETY, at 8.30.—Colour and Constitution of Azo-compounds. Part II. The Salts of *p*-Hydroxyazo-compounds with Mineral Acids: J. J. Fox and J. T. Hewitt.—The Oxidation of Aromatic Hydrazines by Metallic Oxides, Permanganates, and Chromates: F. D. Chattaway.—Studies in Fermentation. II. The Mechanism of Alcoholic Fermentation: A. Slator.—Organic Derivatives of Silicon. Part IV. The Sulphonation of Benzylethylpropylsilicyl Oxide and of Benzylethyldipropylsilicane: H. Marsden and F. S. Kipping.—The Formation and Reactions of Imino-compounds. Part VI. The Formation of Derivatives of Hydrindene from *o*-Xylylenedinitrile: C. W. Moore and J. F. Thorpe.

FRIDAY, JANUARY 17.

ROYAL INSTITUTION, at 9.—The Centenary of Davy's Discovery of the Metals of the Alkalis: Prof. T. E. Thorpe, C.B., F.R.S.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Third Report to the Gas-Engine Research Committee: Prof. F. W. Burstall.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Principles of Engineering Geology: Dr. Herbert Lapworth.

SATURDAY, JANUARY 18.

ROYAL INSTITUTION, at 3.—The Electrification of Railways: Prof. Gisbert Kapp.

MONDAY, JANUARY 20.

SOCIETY OF ARTS, at 8.—The Theory and Practice of Clock Making: H. H. Cunynghame, C.B.

VICTORIA INSTITUTE, at 4.30.—Resemblances between Jewish Ideas and Customs and Those of India: Col. T. H. Hendley.

TUESDAY, JANUARY 21.

ROYAL INSTITUTION, at 3.—The Internal Ear of Different Animals: Dr. Albert A. Gray.

ROYAL STATISTICAL SOCIETY, at 5.

MINERALOGICAL SOCIETY, at 8.—On Zeolites from the Neighbourhood of Belfast: F. N. A. Fleischmann.—On Strüverite and its Relation to Ilmenorutile: Dr. G. T. Prior and Dr. F. Zambonini.—Twin-structure: Dr. J. W. Evans.—On a Simple Method of Drawing Crystals of Calcite and other Rhombohedral Crystals, and of Deducing the Relations of their Symbols: Prof. W. J. Lewis.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Experimental Investigations of the Stresses in Masonry Dams Subjected to Water Pressure: Sir J. W. Ottley, K.C.I.E., and Dr. A. W. Brightmore.—Stresses in Dams: an Experimental Investigation by Means of India-Rubber Models: J. S. Wilson and W. Gore.—Stresses in Masonry Dams: E. P. Hill.

WEDNESDAY, JANUARY 22.

GEOLOGICAL SOCIETY, at 8.—The Origin of the Pillow-Lava near Port Isaac in Cornwall: Clement Reid, F.R.S., and Henry Dewey.—On Subdivision of the Chalk of Trimmingham (Norfolk): R. M. Brydone.

SOCIETY OF ARTS, at 8.—Siam and its People: H. Hillman.

THURSDAY, JANUARY 23.

ROYAL SOCIETY, at 4.30.—*Probable Papers:* Report on the Eruption of the Soufrière in St. Vincent in 1902, and on a Visit to Montagne Pelée in Martinique. Part II.: Dr. Tempest Anderson.—On the Intimate Structure of Crystals. Part VI., Titanic Oxide, its Polymorphs and Isomorphs: Prof. W. J. Sollas, F.R.S.—Dietetics in Tuberculosis. Principles and Economics: Dr. N. D. Bardswell and Dr. J. E. Chapman.—The Origin and Destiny of Cholesterol in the Animal Organism Part I., On the so-called Hippocoprosterol: C. Dorée and Dr. J. A. Gardner.

ROYAL INSTITUTION, at 3.—Recent Light on Ancient Physiographies: Prof. W. W. Watts, F.R.S.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Standard Performances of Electrical Machinery: R. Goldschmidt.

FRIDAY, JANUARY 24.

ROYAL INSTITUTION, at 9.—The Extinction of Malta Fever: Col. David Bruce, C.B., F.R.S.

PHYSICAL SOCIETY, at 5.—Recalescence Curves: W. Rosenhain.—An Experimental Examination of Gibbs' Theory of Surface Concentration Regarded as the Basis of Adsorption, and an Application to the Theory of Dyeing: W. C. M. Lewis.

INSTITUTION OF CIVIL ENGINEERS, at 8.—A Cost Theory of Reinforced-Concrete Beams: J. R. Wade.—The Neutral Axis in Reinforced-Concrete Beams: E. I. Spiers.

SATURDAY, JANUARY 25.

ROYAL INSTITUTION, at 3.—The Electrification of Railways: Prof. Gisbert Kapp.

MATHEMATICAL ASSOCIATION, at 2.30.—Address by the President, Prof. G. H. Bryan, F.R.S.—On the Teaching of Elementary Mechanics, with Special Reference to the Preparation and Use of Simple and Inexpensive Apparatus: W. J. Dobbs.—On the Teaching of the Elements of Analysis: C. O. Tuckey.—On the Geometrical Treatment of Series in Trigonometry, with Lantern Illustrations: F. J. W. Whipple.—On a New Treatment of Similarity in Elementary Geometry: W. E. Bryan.—Machine for Drawing Rectangular Hyperbolas: H. L. Trachtenberg.

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